EDS
DRAFT RARF Addendum 2 Guide

v0.02

REVISION HISTORY

Date	Version	Description	Author
01/28/2007	0.01	Draft for Internal Review	D. Showalter
01/28/2007	0.02	Draft for Release with Addendum	D. Showalter

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IMPORTANT INFORMATION

This addendum is to provide improvements in two important areas- first to allow all operational configurations to be registered with ERCOT (per January 2008 TPTF/ERCOT discussions) , and second to better capture the combined-cycle data.

For data purposes, the focus of this addendum is to gather additional information on the combined cycle configurations as well as to improve the transition matrix. This addendum will serve as the official submittal of combined cycle configuration information and will be used in the final RARF to be sent to Resource Entities for verification, edits, and certification. This addendum supersedes any RARF data in the configuration and transition matrices, as well as any resource parameter data filled into columns N-U of the combined cycle tab of the RARF.

The Addendum has locked fields – these fields are from the RARF and are provide for reference. If a field is gray or hatched, then there was no unit or configuration information available. If the unit information is not available, then there is a correction to be made on the RARF. If the configuration information cells hatched, then a correction needs to be made to the configuration matrix.

All data in this addendum is combined cycle train specific. No unit information is requested. If an entity requires more than 30 configurations, please work with ERCOT to extend your form. Please keep in mind that QSEs will have to submit a Current Operating Plan (COP) for each configuration, so it may not be advantageous to register every configuration.

For both the RARF and the Addendum, the unit and site codes should not be changed, as these correlate to existing codes used in ERCOT systems.

ADDENDUM 2 SUBMITTAL

Please send the completed document to NodalMarketTransition@ercot.com by February 29, 2008 for this information to be available for testing and for pre-population in the final RARF.

ERCOT ASSISTANCE

ERCOT will host a workshop to discuss this Addendum both in person and via WebEx on Thursday, January 31, 2008 beginning at 12:00 noon, CST. A notice was sent on January 25 with the details for this session.

In addition, Resource Entities may request an individual meeting between February 4 and 15 by sending an email to NodalMarketTransition@ercot.com. Please include the preferred meeting time of 9, 10, or 11 am CST.

Please contact your Account Manager or send a request to NodalMarketTransition@ercot.com if problems or questions arise.

ADDENDUM 2 – GENERAL INFORMATION TAB

This section applies to ALL combined cycle generation resources.

This tab exists for each train at a facility. The purpose of this tab is to provide enough information for each unit of the train to ensure Resource Entities and ERCOT keep the units properly identified. There is no information to be updated on this tab – it correlates directly to the RARF.

ADDENDUM 2 – CCx CONFIG TAB

This section applies to ALL combined cycle generation resources.

This section is pre-populated with the unit mnemonic, the unit type, and the nameplate MVA rating for reference. CCx refers to a combined cycle train, i.e. CC1 or CC2 or CC3.

Previously, ERCOT limited registration of configurations to be no more than the number of units in the train. In this registration, you are allowed to establish and register all operationally unique configurations what configurations to register with ERCOT. When registering more configurations, keep in mind that the configurations represent logical configurations (1-0, 2-0, 1-1, etc), and does NOT represent uniqueness for individual units. So in the example below, whether running Unit1&Steamer or Unit2&Steamer, it would still only represent one unique configuration of 1-on-1.

Please enter unique configurations for each train. Assistance with developing all unique configurations can be found later in this document. The keys to identifying the configurations properly include defining the configurations to increase in MW and in units from left to right (configuration 1 through xx).

As a configuration is entered, the cells for all the resource parameters for that configuration will become available for data entry. The resource parameters must be filled in as this will overwrite any RARF submittals for all configurations.

Please refer to the RARF guide, http://nodal.ercot.com/readiness/rq/documents/index.html, for additional information on the resource parameters. Key sections are 5.0, 9.0, and 13.1.

ADDENDUM 2 – CCx TRANSITIONS TAB

This section applies to ALL combined cycle generation resources.

As a configuration is entered into the CCx Config tab, cells will open up in the corresponding CCx Transition tab. This table is a map that, for each operating state/configuration that you are in, identifies what states/configurations you can go to next – whether it is adding a unit or removing a unit. This map is critical to the Nodal systems.

STEPS TO DEVELOP CONFIGURATIONS AND TRANSITIONS

This section applies to ALL combined cycle generation resources.

The following are some steps that may aide you in developing your configurations and transitions. These steps are not required – just some tips to aid in filling out Addendum 2.

There is also an example included. For this example, assume a three unit train named ABC_CC1, consisting of two 100MW combustion turbines (CT) and one 100MW steam turbine (CA). When one CT is on, assume the CA can operate at 50% output. This example is not accurate and should not be used to make any registration decisions.

Step 1:

Establish and register all operationally unique configurations what configurations to register with ERCOT. When registering more configurations, keep in mind that the configurations represent logical configurations (1-0, 2-0, 1-1, etc), and does NOT represent uniqueness for individual units. In the example below, whether running Unit1&Steamer or Unit2&Steamer, it would still only represent one unique configuration of 1-on-1. Additional background to assist with this step can be obtained from the combined cycle whitepaper found at http://www.ercot.com/calendar/2008/01/20080121-TPTF.html, item 31.

This step should also establish a configuration order, 1 through xx (where xx represents, at a maximum, the number of unique configurations for your train). The sort order for the configurations should be from lowest MW to highest. A secondary sort order, if needed, would be to assign the lower configuration number to the configuration with fewer units operating.

Step 1 Example:

CC1 can operate in four unique configurations – 1x0, 2x0, 1x1, and 2x1. Each configuration has a different MW output. These configurations and the output have been identified in the table to the right. Applying the configuration order requirement, the yellow cells identify the order that they should be entered into the CCx Config table.

CC1		MW	1x0	2x0	1x1	2x1
Unit 1	CT	100	x	x	x	x
Unit 2	CT	100	a	x	a	x
Unit 3	CA	100			x	x
		300	100	200	150	300
			1	*3*	*2*	*4*

Step 2:

Enter the configurations into the CCx Config tab of Addendum 2.

Step 2 Example:

Unit Code / Mnemonic	Unit Type, MVA	ABC_CC1_1	ABC_CC1_2	ABC_CC1_3	ABC_CC1_4
ABC_Unit1	CT, 120MVA	X	X	X	X
ABC_Unit2	CT, 120MVA	A	A	X	X
ABC_Unit3	CA, 120MVA		X		X

Step 3:

Enter resource parameter information for the configurations. For information on filling out this section, see the RARF guide and the white paper. Links to these documents are above.

Step 3 Example:

Field Description	ABC_CC1_1	ABC_CC1_2	ABC_CC1_3	ABC_CC1_4
High Reasonability Limit (Max Net MW level)	95	140	190	285
Low Reasonability Limit (Min Net MW level)	30	45	60	75
High Reasonability Ramp Rate Limit (Max ramp MW/min)	5	2	5	2
Low Reasonability Ramp Rate Limit (Min ramp MW/min)	2	1	2	1
Seasonal Net Max Sustainable MW Rating- Spring	95	140	190	285
Seasonal Net Min Sustainable MW Rating- Spring	30	45	60	75
Seasonal Net Max Emergency MW Rating- Spring	100	150	200	300
Seasonal Net Min Emergency MW Rating- Spring	25	40	55	70
Seasonal Net Max Sustainable MW Rating- Summer	95	140	190	285
Seasonal Net Min Sustainable MW Rating- Summer	30	45	60	75
Seasonal Net Max Emergency MW Rating- Summer	100	150	200	300
Seasonal Net Min Emergency MW Rating- Summer	25	40	55	70
Seasonal Net Max Sustainable MW Rating- Fall	95	140	190	285
Seasonal Net Min Sustainable MW Rating- Fall	30	45	60	75
Seasonal Net Max Emergency MW Rating- Fall	100	150	200	300
Seasonal Net Min Emergency MW Rating- Fall	25	40	55	70
Seasonal Net Max Sustainable MW Rating- Winter	95	140	190	285
Seasonal Net Min Sustainable MW Rating- Winter	30	45	60	75
Seasonal Net Max Emergency MW Rating- Winter	100	150	200	300
Seasonal Net Min Emergency MW Rating- Winter	25	40	55	70
Minimum On Line Time (hrs)	1	2	1	2
Minimum Off Line Time (hrs)	1	1	1	1
Hot Start Time (hrs)	1	2	1	2
Intermediate Start Time (hrs)	2	4	2	4
Cold Start Time (hrs)	3	6	3	6
Max Weekly Starts	10	5	10	5
Max On Line Time (hrs)	2000	2000	2000	2000
Max Daily Starts	2	1	2	1
Max Weekly Energy	16800			
Hot-to-Intermediate Time (hrs)	2	2	2	2
Intermediate-to-Cold Time (hrs)	3	3	3	3
Normal Ramp Rate Curve				
MW1 (MW1/Low to MW5/High end of curve)	30	45	60	75
Upward RampRate1 (MW/minute)	5	2	5	2
Downward RampRate1 (MW/minute) positive number	2	1	2	1
MW2	95	80	95	100
Upward RampRate2 (MW/minute)	5	3	6	3
Downward RampRate2 (MW/minute)	2	3	3	3
MW3		110	110	180
Upward RampRate3 (MW/minute)		4	5	4
Downward RampRate3 (MW/minute)		3	2	3
MW4		140		285
Upward RampRate4 (MW/minute)		1		1
Downward RampRate4 (MW/minute)		5		5
MW5				
Upward RampRate5 (MW/minute)				
Downward RampRate5 (MW/minute)				

Step 4:

Construct a state diagram, where each configuration is a "state" represented by a circle. Then arrows are drawn from each configuration to any other that can be reached **within the minimum online time.**

The state diagram should be laid out from left to right, where OFFLINE is furthest to the left, and the highest configuration number is furthest to the right. Draw arrows between states/configurations to indicate where the train could operate next. If the configurations were assigned correctly, arrows to the right should add a unit and increase MW. Arrows to the left should indicate decreasing MW and units. This diagram will help you build an accurate matrix for the Nodal systems.

Step 4 Example:
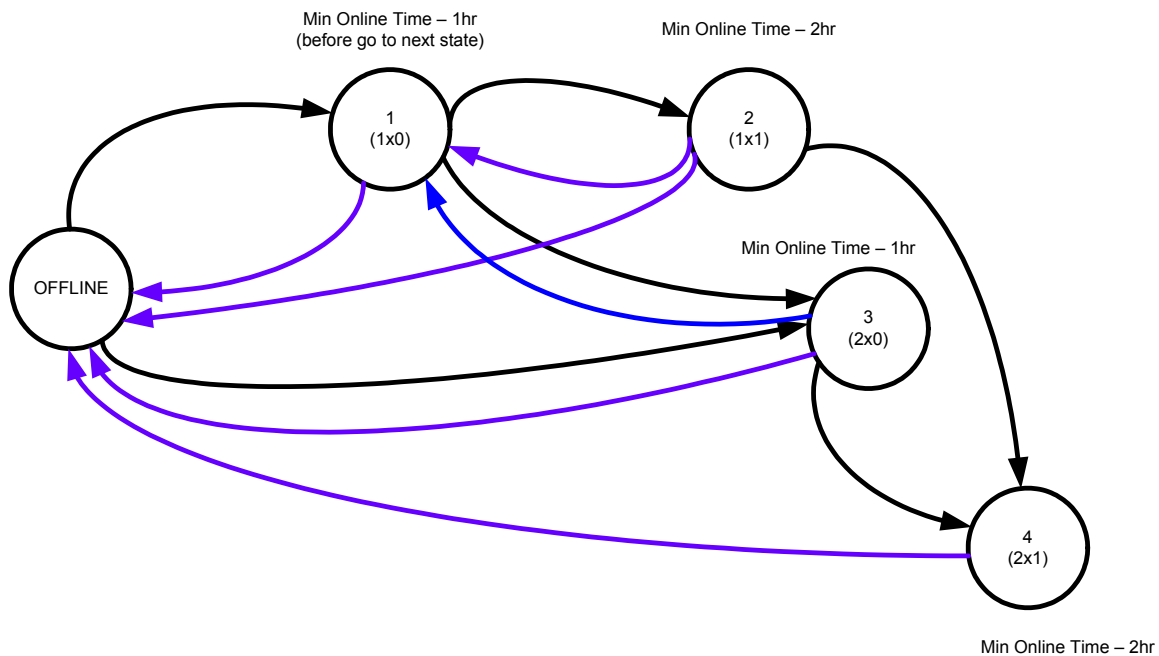
Step 5:

Go to the transition tab, CCx Transitions, to complete the transition matrix.

Referring to the state diagram constructed in Step 4, each arrow should be an X in the matrix. With this layout, and arrow from left to right will be entered as an X in the transition matrix *above* the black diagonal, and any arrow from right to left will be entered as an X in the transition matrix *below* the black diagonal.

Please keep in mind that the unit will stay in the any one state/configuration for the duration of the minimum online time.

Step 5 Example:

From Offline, this train can go to ABC_CC1_1 or ABC_CC1_2. This could be any state that could be reached in one hour from offline. The unit will stay in the initial state for the duration of the minimum online time.

From \ To	Offline	ABC_CC1_1	ABC_CC1_2	ABC_CC1_3	ABC_CC1_4
Offline		X		X	
ABC_CC1_1	X		X	X	
ABC_CC1_2	X	X			X
ABC_CC1_3	X	X			X
ABC_CC1_4	X				

In this example, the train could reach Configuration 4 after 1 hour by going from Offline to Configuration 3 (ABC_CC1_3), wait the minimum online time of 1 hour, then transition to Configuration 4 (ABC_CC1_4). If the steamer can't be ready in 1 hour, then the minimum online time should be increased for Configuration 3.

Alternatively, the train could reach Configuration 4 in 3 hours by going from ABC_CC1_1, wait 1 hour, go to ABC_CC1_2, wait 2 hours, then go to ABC_CC1_4. Again, if the steamer cannot be ready in 1 hour, then the minimum online time for Configuration 1 should be increased.

Complete these steps for each CC train. As a reminder, the combined cycle whitepaper and RARF guide are available as additional references.